

Mr. Mordey, on account of lack of time, dealt shortly with the drop of pressure along the rails of an electric tramway, and stated that he had found that when the length was even 28 miles, the difference of potential between any parts of the rails and the generating station could be kept down to 7 volts; and he referred to the much greater attention that was given in England than in America to reducing the maximum drop of pressure along tramway rails. The employment of rotary transformers, as on the new Central London Railway, he deprecated as a makeshift, and suggested that, if the cost of all the transformers employed along the 6 miles of the route had been capitalised, it would have paid the company to have employed far thicker conductors. As regards the difficulty arising from the capacity of long underground cables traversed with alternate current, he pointed out that no difficulty in overcoming the effects of capacity had ever been met with in dealing with the 250 miles of underground cable in St. Petersburg. The Board of Trade had succeeded in using such instruments in their laboratory at Westminster that no interference could be caused by the construction of any electric tramway in the neighbourhood; therefore, he deplored the resistance that had been successfully offered a few years ago by a London college to the passing of a Bill for the construction of an underground electric railway near that college.

Mr. Mailloux pointed out that the small power-factor obtainable with alternate current motors, and the greater change in speed with a change in the E.M.F. that was experienced with alternate current than with direct current motors, was a serious objection to the employment of the former, and he instanced a case where the large current that was necessary for starting an alternate current motor had led him to adopt a direct current system in a sugar factory where 2000 horse-power was employed. The Fire Insurance Rules in the United States, which compelled the use of iron conduits, but which did not require that both the going and return conductors should be enclosed in the same iron tube—a condition, however, rendered necessary if alternate currents were employed—led to an important economy being obtained by using two separate conductors in separate iron tubes, which was, of course, quite possible with a direct current.

Prof. S. P. Thompson expressed his surprise that in wiring ships for electric lighting, where the possible disturbance of the compasses was a vital consideration, the direct current and two pole machines, the worst type to use, had been frequently employed even by the best firms, like that of Messrs. Siemens. He looked forward to seeing the use of multipolar machines on board ship, and of the alternating current; for not only would the compasses be then secure from disturbance, but there would be much greater freedom from electrolysis in damp places, and therefore of fire. He pointed out that the alternate current lent itself so readily to the use of efficient *low* voltage glow lamps combined with economic *high* voltage transmission; and finally that, since it was impossible to employ any device to screen a magnetic observatory from magnetic disturbance, since such a device would cut off the effects produced by variations of the earth's magnetism which the observatory existed to measure, there was a strong reason for running electric tramways with alternating current in any city where a magnetic observatory existed.

At the close of the preceding discussion, M. Hospitalier, Mr. Gavey, Mr. Hering and General Webber referred to points of special and novel interest in the several electrical sections of the Exhibition, in connection with which they had served as jurors; and in the afternoon these gentlemen acted as guides in taking parties of members of the two electrical societies to view the exhibits which had been specially mentioned.

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THREE BOOKS OF POPULAR NATURAL HISTORY.¹

MR. HUDSON has never written any book that is not extremely pleasant to read, though since he settled in England he has never had so much to tell us as was told in his "Naturalist in La Plata." That book, though it may not be his own favourite, will always, if we are not mistaken, be reckoned as his best; and the reason is simply that it treated of animal life among which *he* was entirely at home, and of which *we* knew little or nothing. His English books have not this quality, though they have many other excellences. The one before us, for example, is charmingly written, full of grace and feeling, touched with a tender and sympathetic imagination, made piquant by a certain quite inoffensive egotism; but, as we read in his pages of the South Downs, we are forced to recognise the fact that he is not of them. He is a stranger there—a most appreciative one, it is true—but still a stranger. It is perhaps given to few who have not been bred among the Downs to enter fully into their spirit, and we will not deny that Mr. Hudson, rambling alone through their sweet air and lying on their delicious turf, has caught it as none could do without rare gifts of sympathy and observation; yet there is something missing.

It is not pleasant to have to find fault with a book so readable; but a naturalist cannot but regret that Mr. Hudson should have given himself up so entirely to *impressions* throughout a volume of just three hundred pages, that no real contribution to natural history is to be found in them. He notices an interesting point, writes a charming paragraph about it, and leaves it, sometimes without making it clear what plant or creature he is talking about. To take an example: he has observed that the banded variety of *Helix nemoralis* is almost the only one to be found on the high downs, and that its bright coloration does not save it from the thrushes; but he does not pursue this fact, which has attracted the attention of conchologists and suggested at least one interesting explanation. Snail life on the downs is, indeed, so extraordinarily abundant, that a book which contains so much pleasant reading about the down turf is hardly complete without a chapter specially devoted to it. The same may be said of his remarks on insect life; he tells us of the common blue butterfly, and its habit of clinging to the bents, but of other blues he says nothing; a skipper is mentioned, but we are left in the dark as to the species. In writing of a certain fly, he declares that neither books nor entomologists have been able to tell him its name, and leaves it with a few words of good-natured contempt for the specialism of the present age. A little more exactness in a book by a naturalist, which naturalists may be expected to read, would have greatly added to its permanent value. Even men of letters may complain when they find an allusion to Arthur Young's famous "Tour through Great Britain in 1727." What book can this be?

The best chapters are those which deal with the birds and the human beings of the downs. Shepherds and shepherd boys are delightfully pictured; and Mr. Hudson has discovered for himself the pleasing habit of the ruddy-faced shepherd lads in adorning themselves with wild flowers. About the birds he has plenty to tell us—it is his own subject; and the chapter on "Shepherds and Wheat-ears" will be read by all ornithologists with mingled pleasure and pain. All that he writes of the singers of the downland is beautiful and true; perhaps the songs of the stonechat and whinchat have never

¹ "Nature in Downland." By W. H. Hudson. Pp. xii + 307. (London: Longmans, Green and Co., 1900.)

"The Birds of Cheshire." By T. A. Coward and Charles Oldham. Pp. 278. (Manchester: Sherratt and Hughes, 1900.)

"In Birdland, with Field-glass and Camera." By Oliver G. Pike. Pp. xvi + 280. (London: T. Fisher Unwin, 1900.)

been so well described. Of the linnet, too, he says most truly that it has one note, and only one, of almost unapproachable musical beauty. The singing of the skylarks, that invariable accompaniment of down life, is described with all Mr. Hudson's wonderful sympathy and delicacy of language; but what are we to say of his belief that the highest notes of this bird may be heard on the downs at a distance of three miles? It is a belief which it would hardly be possible to test.

"The Birds of Cheshire" is an excellent book of its kind. The first essential of such a compilation is that it should be unimpeachable as a record; and, so far as we can discover, the compilers have here used both pains and judgment in testing the records of others, while their own experiences are recorded simply and faithfully. Thus a real step is gained in the collection of valuable material for that comprehensive work on the distribution of birds in these islands which we may hope to see in due time. There is no superfluous matter in this volume, and no



FIG. 1.—Bearded Tit feeding young.

attempt at fine writing; and excellent paper, print and binding combine to make it a very pleasant book to handle. The half-dozen plates of Cheshire scenery are very effective, and nothing is wanting, unless it be a rather better map of the county.

The avifauna of Cheshire, as the authors remark, is surprisingly poor; the county does not lie upon any regular line of migration. It is too far north for the nightingale, which has seldom occurred, though we note that it has been recorded by that excellent observer, Rev. C. Wolley-Dod. The lesser whitethroat, as might be expected, is not common, nor is the grasshopper warbler. We should have expected the pied flycatcher to be more common than seems to be the case; the tree sparrow, a bird of peculiar distribution, has probably been often overlooked. The goldfinch and linnet are decreasing in numbers, but the opposite is the case with the turtle-dove. The list of waders, gulls, and birds of the coast, is not very large, and we regret to find that

the ubiquitous golfer is contributing to its further diminution. The characteristic bird of the county is a noble one—the great crested grebe, which is widely distributed; and in dealing with it the authors have allowed themselves some half-a-dozen pages, which will be welcome to all ornithological readers.

Mr. Pike's little book bears the same relation to his photographs as a popular lecture does to its lantern illustrations: *i.e.* it is of secondary interest. Photography, applied to birds and their nests and eggs, seems to be a most attractive pursuit, leading its votary often to spend hours in the endeavour to catch a bird at some opportune and interesting moment, or to find the nest on which he has set his heart. It should certainly be useful in training the faculty of observation, and in assisting the memory; and it may become a most welcome substitute for the predatory habits of private egg-collectors, who are perhaps the most dangerous enemies of our rarer birds. The actual contribution to zoology, however, does not seem as yet to have been great, and it is quite possible that before long we may have too many books on the subject. Mr. Pike's is, however, so unpretending and so pleasantly written, that it will no doubt be welcome to many beginners in ornithology who wish to learn where and how to look for nests, and a few of his experiences and his photographs will be interesting even to the more experienced. Part iv., on Norfolk birds, is perhaps the most valuable section of the book, and of the three photographs which Mr. Pike succeeded in taking of the nest of the bearded tit we select one for reproduction, as a favourable specimen of his work.

THE INTERNATIONAL CONGRESS OF MATHEMATICIANS.

A CONGRESS of mathematicians was held at Chicago during the World's Fair; but this was an isolated one. The series of international congresses was inaugurated at Zürich in 1897, and the second congress of this series met in Paris from the sixth to the eleventh of the present month. About 225 mathematicians of various nationalities, with 25 members of their families, were present. It had been expected that the numbers would be very much greater, as many as one thousand provisional acceptances having been received before last December; the diminished attendance was doubtless due partly to the great heat of the preceding month, but probably in greater measure to the fear of exhibition crowds and exhibition extortions. It had been supposed that the Exhibition would attract people to the Congress; on the contrary, it seems to have kept them away. The composition of the Congress was certainly international; the numbers of members from the different countries were approximately as follows:—France, 90; Germany, 25; United States, 17; Italy, 15; Belgium, 12; Russia, 9; Austria and Hungary, 8; Switzerland, 8; England, 7; Sweden, 7; Denmark, 4; the remainder being from South America (4), Holland, Spain, Roumania, Servia, Portugal, Turkey, Armenia, Greece, Canada, Mexico, Japan.

The actual business was preceded by a *réunion* at the Café Voltaire, on the evening of August 5, when about half the members were present. The proceedings proper consisted of two general meetings on Monday and Saturday, with sectional meetings on the four intervening days. The opening general meeting had been announced for 2.30 p.m., August 6, in the Palais des Congrès in the Exhibition grounds; but unfortunately some action on the part of the Exhibition authorities necessitated changing the hour to the morning, and this change was decided upon too late to be communicated to all the members, many of whom had not even arrived in Paris at that hour. Thus a considerable number of the